REMARKS

Claims 2, 6, and 11 have been cancelled. Claims 1 and 5 have been amended. Claims 1, 3-5, 7-10, and 12-14 are currently pending in the application.

The Examiner rejected claims 1, 3-5, 7-10, and 12-14 under 35 U.S.C. § 103(a) as being unpatentable over Rossi et al. (USPN 6,974,973; hereinafter "Rossi") in view of Borg (EPAP 1 117 250 A2). Applicant respectfully requests reconsideration of the application.

The Manual of Patent Examining Procedure states the following in Section 2143:

> To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

Applicant submits the combination of Rossi and Borg does not render Applicant's claims 1, 3-5, 7-10, and 12-14 obvious because the combination does not meet the three basic criteria. The argument below, however, will focus on the third criterion.

Applicant's independent claim 1 recites "transferring signals substantially simultaneously from each of the plurality of sample and hold circuits to an operational amplifier on one clock cycle which operational amplifier produces a substantially average dark signal for each row of dark reference pixels". Independent claim 5 recites "an operational amplifier that receives dark voltage signals for each row of dark reference pixels from each of the sample and hold circuits on one clock cycle, wherein the operational amplifier produces an average dark reference signal for each row of dark voltage signals." And independent claim 12 recites "an operational amplifier that receives a signal from each of the sample and hold circuits on one clock cycle, wherein the operational amplifier averages the signals from the sample and hold circuits for providing an approximate average dark reference pixel signal." Nothing found in Rossi and Borg teaches or suggests these aspects of the claimed invention.

Rossi discloses a system for compensating for temperature induced variations in an image sensor. Figure 3b illustrates a signal path that is used for both dark pixels and clear pixels. The sample and hold circuits (33) sample pixel signals from the array "row-by-row and column-by-column within a row" (col. 4, line 25-27). Thus, as shown in figure 3b and described in the corresponding description, only one pixel in each row, whether dark or clear, is sampled at a time using the column select switches. Each pixel, whether clear or dark, provides two signals; a reset signal and an image signal. These two signals are subtracted to yield an actual signal (see col. 4, lines 23-32).

The Examiner states on page 2 of the final office action that since the lower portion of the imaging array contains only dark reference pixels, and the pixels are sampled "row-by-row", Rossi teaches reading out rows of only dark pixels. Applicant respectfully submits the Examiner is incorrect in this statement. Rossi expressly states pixels are read out of the "array row-by-row <u>and column-by-column within a row</u>" (col. 4, line 26-27; emphasis added).

Borg discloses an active pixel sensor circuit that uses a signal from one dark pixel in a row as a reference signal. Borg shorts the sense nodes of several reference pixels in a row together by shorting the photo diode output nodes together (paragraph [0021]). This averages out the differences in the dark current from pixel to pixel as well as the shot noise associated with the dark current together (paragraph [0025]). Because the sense nodes of several dark pixels in a row are shorted together, the column output of only <u>one</u> of the reference pixels is used as a reference signal (paragraph [0022]). The column output of the one reference pixel is then input into a buffer (e.g., buffer 34). The output of the buffer is input into a column amplifier (e.g., column amplifier 38). The output of the column amplifier (38) is a difference of a common mode voltage (V_{CM}) and the reference signal (see paragraph [0024] and equation 1).

The Examiner states on pages 8, 11, and 15 of the final office action that Borg teaches reading out simultaneously, or on one clock cycle. "Reading pixels out 'row-by-row' means that an entire row of pixels is read out at the same time." Applicant respectfully submits the Examiner must consider, in addition to this language, the express statements in Borg that the sense nodes of "many reference

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pixels" are shorted together to average out differences in pixel dark currents and the shot noise (paragraph [0025]) and the "column output of one of the reference pixels, for example pixel 30, is provided as a reference signal" (paragraph [0022]).

The Examiner further states on pages 8, 11, and 15 of the final office action that "the outputs from the pixels are shorted together into the operational amplifier (38) with a common mode voltage V_{CM}, and an average dark reference signal is output." Applicant respectfully submits the Examiner is incorrect in that operational amplifier (38) does not produce an average dark reference signal. The average dark reference signal is produced by shorting the sense nodes of "many reference pixels" together. This average dark reference signal is input into buffer (34). The output of buffer (34) is input into amplifier (38), which produces a difference of a common mode voltage (V_{CM}) and the reference signal (see paragraph [0024] and equation 1).

Moreover, the dark photodiode signals are averaged by shorting the sense nodes of "many reference pixels" together but, because only one dark reference pixel (30) is sampled, the differences in the source followers (34) are not compensated for in Borg. Unlike Borg, the present invention compensates for the differences in the source followers.

Applicant submits the combination of Rossi and Borg does not render Applicant's independent claims 1, 5, and 10 obvious because neither Rossi nor Borg teaches or suggests transferring signals from each of the plurality of sample and hold circuits to an operational amplifier on one clock cycle. Borg reads the signal from only one of the reference pixels and uses that signal as reference signal. And as noted by the Examiner on page 7 of the final office action, Rossi does not "explicitly teach that the pixels are read out simultaneously, or on one clock cycle, from the sample and hold circuits (33)."
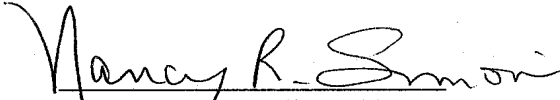
Additionally, the combination of Rossi and Borg does not render Applicant's independent claims 1, 5, and 10 obvious because both Rossi and Borg fail to teach or suggest an operational amplifier that produces a substantially average dark signal for each row of dark reference pixels. As noted by the Examiner on page 7 of the final office action, Rossi does not "teach that the operational amplifier (35) produces a substantially average signal from all the signals in the sample and hold

circuits (33)." And the operational amplifier (38) in <u>Borg</u> produces a difference of a common mode voltage (V_{CM}) and the reference signal, and not an average dark signal for each row of dark reference pixels.

"If an independent claim is not rendered obvious by prior art, then any claim depending from the independent claim is not obvious." In re Fine, 5 USPQ2d 1596 (Fed. Cir. 1988) (see also M.P.E.P. § 2143.03). Claims 3 and 4 depend from independent claim 1, claims 7-9 depend from independent claim 5, and claims 12-14 depend from independent claim 10. Since the combination of <u>Rossi</u> and <u>Borg</u> does not render independent claims 1, 5, and 10 obvious, dependent claims 3, 4, 7-9, and 12-14 are also not obvious in view of <u>Rossi</u> and <u>Borg</u>.

In view of the foregoing amendments and remarks, reconsideration of this patent application is respectfully requested. A prompt and favorable action by the Examiner is earnestly solicited. Should the Examiner believe any remaining issues may be resolved via a telephone interview, the Examiner is encouraged to contact Applicants' representative at the number below to discuss such issues.

Respectfully submitted,

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If the Examiner is unable to reach the Applicant(s) Attorney at the telephone number provided, the Examiner is requested to communicate with Eastman Kodak Company Patent Operations at (585) 477-4656.